

# High Prevalence of Symptomatic Hepatitis A Infection in Rural Area of Chaharmahal VA Bakhtiari Province, Iran

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## ABSTRACT

**Introduction:** Hepatitis A virus (HAV) is the most common cause of hepatitis during childhood and is an important public health problem. Therefore, the aim of this study was to investigate an outbreak of symptomatic viral hepatitis in children and in young adults in a rural area from Chaharmahal Va Bakhtiari Province, Iran.

**Materials and Methods:** Serum samples from the 70 patients with icterus, who were suspected for HAV infection, referred to a therapeutic center in a central province of Iran from February to July, 2010 were tested for IgM specific antibody to HAV, using

Enzyme linked Fluorescent assay (ELFA) Kit (General Biological Corp., Hsinchu, Taiwan).

**Results:** All of the 70 children had jaundice. The ELFA results showed that 48 out of 70 (68.6%) tested positive for anti-HAV specific antibody (IgM). The mean age of the individuals were 12.81±12.2 and 23 of them (32.8%) were females. There was significant relationship between seropositivity for IgM anti-HAV antibody and age group in the patients studied ( $p<0.05$ ).

**Conclusion:** The high number of cases identified, may indicate an outbreak of hepatitis A in this region with the children as the most susceptible age group to this symptomatic infection.

**Keywords:** Hepatitis A virus, Infectious hepatitis, Jaundice, Viral infection

## INTRODUCTION

Viral hepatitis is one of the most important public health problems around the world. One of these viruses, HAV is a small, non-enveloped, positive-strand RNA virus with a highly stable icosahedral protein capsid [1]. This virus causes a self limited infection, Hepatitis A infection, with worldwide distribution. The infection is highly endemic in developing countries and most children acquire immunity through asymptomatic infection early in life [2]. In these regions, most of the children under six years of age either asymptotically infected or develop a mild self-limiting illness [3].

The clinical presentation of HAV infection, gastrointestinal, flulike symptoms, and jaundice, in infected individuals is strongly age dependent [4,5]. HAV infection in young children is often an asymptomatic and in older children and adults is often a symptomatic disease leading to overt illness. About 0.1% to 0.5% of infected adults develop fulminant hepatic failure (FHF), fatal in half of these cases [5]. FHF may occur in persons with underlying chronic liver disease (CLD) [4-7].

HAV infection is transmitted primarily by the fecal oral route. The prevalence of this infection is influenced mainly by general hygiene especially in relation to toilet facilities, water supplies and food preparation. Most of the hepatitis A outbreaks are due to its fecal-oral route of transmission and contamination of food or water with sewage [8-11].

Although this infection is prevalent throughout the world, it shows diverse epidemiological patterns according to the socioeconomic conditions [12]. In developing countries, because of poor living conditions such as inadequate water supply, poor sewage facilities and sanitary conditions, the level of HAV transmission is high. In these hyperendemic countries, most of the population acquired antibodies to HAV by the age of 10 year. Improvement in hygienic and socio-economic conditions have resulted in a decrease in the number of natural childhood infections [13]. There are a few reports indicate that HAV infection is not highly endemic in semi-urban areas of Iran [14-16]. However, most recently, a report suggests that this infection is highly endemic in some other regions of our

country [17]. Here, we report an outbreak of hepatitis A in children less than 10 year of age and young adults of less than 20 year in an overcrowded semi-urban community with poor socio-economic and hygienic conditions, from Iran.

Following HAV infection, the early antibody response is predominantly IgM. This class of antibody is used to establish a diagnosis of acute infection and persists for five to six months. Anti-HAV of the IgG class will be dominant during convalescence and during subsequent life. Therefore, acute hepatitis A infection could be diagnosed by detection of Anti-HAV (IgM) [3,13]. The diagnosis of infectious diseases has been greatly aided by the development of assay systems that can directly detect both viral antigens and antibodies in clinical specimens. Enzyme-linked immunosorbent assay (ELISA) is one of these systems which is widely used as a cost-effective and safe alternative to radio immunoassay [18]. In 1979, Yolken and Stopa demonstrated that the sensitivity of ELISA could be significantly increased by substituting a fluorogenic substrate for a chromogenic one and by measuring the resulting fluorescence in a fluorometer which is named Enzyme-linked Fluorescent assay (ELFA). They also showed that ELFA offers a simple, safe, and inexpensive method of detecting of very small amounts of antigen with high sensitivity [19]. Therefore, in this study, we used ELFA to detect Anti-HAV (IgM) antibody in the above mentioned individuals.

## MATERIALS AND METHODS

In this study, serum samples from a total of 70 patients with icterus, who suspected to HAV infection, were tested for IgM specific antibody to HAV. These patients were referred to a therapeutic center in Chaharmahal Va Bakhtiari Province of Iran from February to July in 2010. The presence of this antibody was tested using ELFA kit (General Biological Corp., Hsinchu, Taiwan). The cut-off value was established according to the manufacturer's instructions.

Statistical analysis was carried out by SPSS software using Pearson chi-square test,  $p$ -value  $<0.05$  was considered statistically significant.

## RESULTS

The ELFA results showed that 48 (68.6%) of the 70 patients tested positive for IgM specific antibody to HAV. Among the 70 patients studied, maximum 39 (55.7%) were one to 10 year of age and one (1.4%) each were 41 to 50 year of age more than 50 year of age. The mean age of the patients studied was  $12.81 \pm 12.2$  and 23 of the patients (32.8%) were female. Regarding the rate of this antibody according to age group, 36 of the 48 (75%) were included in 1 to 10 year of age and 12 (25%) in 11 to 20 year of age [Table/Fig-1]. There was significant relationship between seropositivity for IgM anti-HAV antibody and age group in the patients studied ( $p < 0.05$ ). There was no significant relationship between seropositivity for IgM anti-HAV antibody and sex in these patients ( $p > 0.05$ ). Regarding the number of symptomatic cases identified, we considered this an outbreak of hepatitis A in our region.

Age group (years)	Seropositivity		Seronegativity		Total (positive + negative)	
	No	%	No	%	No	%
1-10	36	92.3	3	7.7	39	55.7
11-20	12	66.7	6	3.3	18	25.7
21-30	0	0	9	100	9	12.9
31-40	0	0	2	100	2	2.9
41-50	0	0	1	100	1	1.4
>50	0	0	1	100	1	1.4

**[Table/Fig-1]:** Prevalence of anti-HAV (IgM) antibody in six age groups of individuals studied  
There was significant relationship between seropositivity for IgM anti-HAV antibody and age group ( $p < 0.05$ )

## DISCUSSION

The patients included in this study were mostly symptomatic, suspected to HAV infection referred to a therapeutic center in a central region of Iran. Based on guideline of clinical case definition of acute viral hepatitis [20], an epidemiological link (common water source) and laboratory confirmation of anti-HAV IgM, acute viral Hepatitis A was confirmed in these individuals. The overall prevalence of anti-HAV was 68.6% and the highest IgM rate (75%) was found in the children less than 10 year.

Acute hepatitis A is usually asymptomatic in most of affected children [21]. Therefore, the detection of 48 out of 70 (68.6%) cases may represent the tip of an iceberg, with many more asymptomatic infections in the community remaining undetected.

The distribution of HAV is variable throughout the world. Countries with HAV prevalence greater than 80% in children up to age of 10 are considered as highly endemic [22]. Based on this, in the high endemicity countries, nearly all children become infected at an early age, when asymptomatic infection is likely [23]. In our study, although symptomatic, most of the infected individuals were under 10-year-old, indicating that our region would be one of the highly endemic regions in Iran.

According to a report from Centers for Disease Control and Prevention, the most important risk factor for HAV infection is personal contact [24]. However, as a common water source was the only water supply in this region and all the affected children had the same water source, the spread of infection could have been due to water contamination. Although, identification of risk factors of HAV infection is difficult [24], as the children are living in a rural area with very poor hygiene and low income, the high rate of symptomatic infection could be attributed to these main risk factors.

Studies from different regions of Iran indicate different situation of hepatitis A infection. A few recent reports suggest that HAV infection is not highly endemic at least in some urban areas of Iran with socioeconomic developments [14-16, 25]. However, the most recent study reported more than 86% seroprevalence of HAV in

some other urban and rural areas [17,26]. Similarly, the results of our study showed high prevalence of symptomatic HAV infection with probably introduction of another endemic region for this infection in our country. The individuals subjected to our study are living in a region with very low socioeconomic situation and no accessibility to clean water. Therefore, these works, together, confirm the suggestion that there are different epidemiological patterns of HAV infection, according to the socioeconomic conditions [3,5].

## CONCLUSION

Our region is one of the highly endemic regions of Iran for hepatitis A infection. It seems that there is different situation of hepatitis A infection regarding the endemicity of this infection in different regions of Iran.

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